IN THE DRAWING:

Please replace the drawing figure with the replacement figure transmitted herewith. The replacement figure is submitted to remove the figure number as shown in the marked up copy submitted herewith.

REMARKS

The Official Action of 9 March 2005 has been carefully considered and reconsideration of the application as amended is respectfully requested.

The specification has been amended to provide section headings in accordance with the preference expressed in MPEP Section 608.01(a) and thereby to remove the basis for the objection at paragraph 1 of the Official Action. In addition, the designation of the sole figure as "Fig. 1" has been changed in accordance with the provisions of 37 CFR 1.84(u)("where only a single view is used in an application to illustrate the claimed invention, it must not be numbered and the abbreviation "FIG." must not appear").

With respect to the objection at paragraph 2 of the Official Action, Applicants respectfully note that a Preliminary Amendment was filed 11 December 2001, which amended the claims to eliminate the multiple dependencies (see copy of Preliminary Amendment and postcard receipt attached). Accordingly, it is respectfully submitted that claims 5-14 should have been treated on the merits. It is respectfully requested that, should such claims now be examined and rejected for the first time, the rejection not be made final.

Claim 1 has been amended to make changes of a formal nature, including placing the claim into Jepson form in accordance with the preference expressed in 37 CFR 1.75(e). The changes do not narrow the scope of the claim. Similarly, the dependent claims have been amended to replace "characterized in that" with "wherein" to render the claims more definite

without narrowing the scope thereof. In addition, claims 2-5 and 7 have been amended to delete the phrases beginning with the linking term "preferably" whereby to remove the bases for the rejections under 35 USC 112, second paragraph appearing at paragraph 3 of the Official Action without narrowing the scope of these claims. The ranges or limitations in the deleted phrases have been included in new claims 22-25.

Claims 1-4 and 15-19 and 21 stand rejected under 35 USC 103(a) as allegedly being unpatentable over Klaus. Applicants respectfully traverse these rejections.

The claimed invention concerns a method and apparatus for steam cracking of hydrocarbons.

Known methods for steam cracking hydrocarbons present several drawbacks, which are addressed by the invention. These drawbacks of the prior art are discussed in detail in page 2, line 5 to page 3, line 27 of the present application and are more particularly:

- a lack of accurate temperature control in the radiation zone of the cracking furnace,
- the impact on the environment due to toxic emissions of gaseous combustion gases (nitrogen oxides), and
- the large size of the furnaces and apparatuses, which increases the costs of the processes.

To solve the above mentioned problems of the prior art, the claimed invention provides a steam cracking method and apparatus according to claim 1 and to claim 15 respectively.

Rejection of claims 1-4

The method of claim 1 is characterized by three characteristics, which in combination provide a solution to the above mentioned problems by lowering the need for fuel and thus decreasing the size of the installation needed as well as toxic gas emissions and by improving the energy yield of the process by recycling and converting into heat all the mechanical and electrical energy produced by cogeneration.

The steam cracking method of KLAUS differs from the method of claim 1 in that:

- the energy source used to complete the process is not essentially provided by cogeneration as the burners of the cracking furnace of KLAUS need to be fed with fuel;
- the steam - hydrocarbon mixture is not pre-heated before cracking by the hot waste gas of the turbine but only the added air used for fuel combustion in the cracking furnace;
- the electrical energy produced by cogeneration is not used to heat the cracking furnace but to operate pumps and compressors within the plant.

In view of these differences between the claimed invention and the cited art, it is respectfully submitted that the cited art does not set forth even a *prima facie* case of obviousness for the invention as claimed. For one thing, the cited art does not show all of the claimed features as is required for a *prima facie* case (see MPEP 706.02(j)). Moreover, the consequences of these differences are respectively that:

- the costs for fuel consumption, and thus the costs of the process, remain very important, as well as the atmospheric pollution due to rejection of toxic combustion gases;
- only radiant heat is produced in the cracking furnace and thus the size of said furnace cannot be reduced and the temperature in the radiation zone cannot be accurately controlled because of regular introduction of "fresh" air (see page 2, lines 5-11 of the present application);
- the electricity generated by cogeneration in KLAUS may not be sufficient to operate the compressors and pumps and thus importing electricity is required that lowers the yield of the plant and increases the operating costs (see KLAUS, col. 2, lines 35-42).

Therefore, KLAUS could not be a good starting point to lead one of ordinary skill in the art of hydrocarbons steam cracking processes to realize the method of claim 1. On the contrary, one willing to solve the problems addressed by the invention would be taught away from the method of claim 1 by KLAUS. Accordingly, there would be no motivation to modify

KLAUS to arrive at the claimed invention such that the reference could not set forth a *prima facie* case of obviousness for this reason as well. (see MPEP Section 706.02 (j)).

Moreover, the rest of the prior art made of record absolutely does not disclose or suggest to use heat-electricity energies produced by cogeneration for pre-heating the steam-hydrocarbons mixture to be cracked and operate an electrical cracking furnace. JP 09235564 A disclosed using an induction furnace, but one of ordinary skill in the art would not arrive at the method of claim 1 by combining it with the teaching of KLAUS. Indeed, both disclose a preheating step by mens of conventional fuel burners, with all the above mentioned drawbacks.

In view of the above defects, KLAUS and the rest of the prior art, taken alone or in combination, do not set forth even a *prima facie* case of obvious for the invention as claimed.

Rejection of claims 15-19 and 21

These claims are drawn to an apparatus for the implementation of the method of claim 1.

The apparatus of claim 15 differs from KLAUS in that:

- the turbine waste gas exhaust line is not connected to a pre-heating chamber of the steam-hydrocarbon mixture itself but to a chamber for heating air used for fuel combustion in the cracking furnace;

- said mixture is not transported into a line passing through said pre-heating chamber and exchanging heat by conduction in contact of turbine combustion gases;
- the electrical lines connected to the electricity generator coupled to the gas turbine are not linked to an electrical heater of the cracking tube but to compressors and pumps.

Furthermore the teaching of the other documents cited by the examiner differs from the apparatus of claim 15 in that:

- it does not disclose a cogeneration apparatus;
- it does not suggest connecting the pre-heating chamber to the exhaust line of the turbine to use the heat energy of gases instead of using fuel burners in said chamber;
- it does not suggest connecting the electrical lines of a cogeneration to the electrical heater of a cracking tube.

Therefore, one of ordinary skill in the art could not have found a proper basis in KLAUS and the rest of the prior art, taken alone or in combination, to arrive at the apparatus of claim 15. More particularly, none of the documents cited by the examiner teaches to modify the pre-heating chamber for heating the steam-hydrocarbon mixture with the hot combustion gases instead of conventional burners and cracking said hydrocarbons in a tube heated and

operated by the electricity produced by a cogeneration. Therefore, it is respectfully submitted that the cited art cannot set forth even a *prima facie* case of obviousness for the apparatus of claim 15 or the claims depending therefrom.

In conclusion, the prior art does not address the problems solved by the claimed invention and does not disclose the combination of characteristics of the method and apparatus according to independent claims 1 and 15. In particular, the claimed invention provides a solution to the problems encountered in the prior art by, at the same time, using substantially all the heat-electricity energy produced by a cogeneration to complete steam-cracking of hydrocarbons and also suppressing the fuel burners and radiant heat furnaces so as to avoid polluting emissions and to allow reduction of the size of the furnaces used for cracking. This is not shown or suggested by KLAUS.

In view of the above, it is respectfully submitted that all rejections and objections of record should be withdrawn and that the application is now in allowable form. An early notice of allowance is earnestly solicited and is believed to be fully warranted.

Respectfully submitted,

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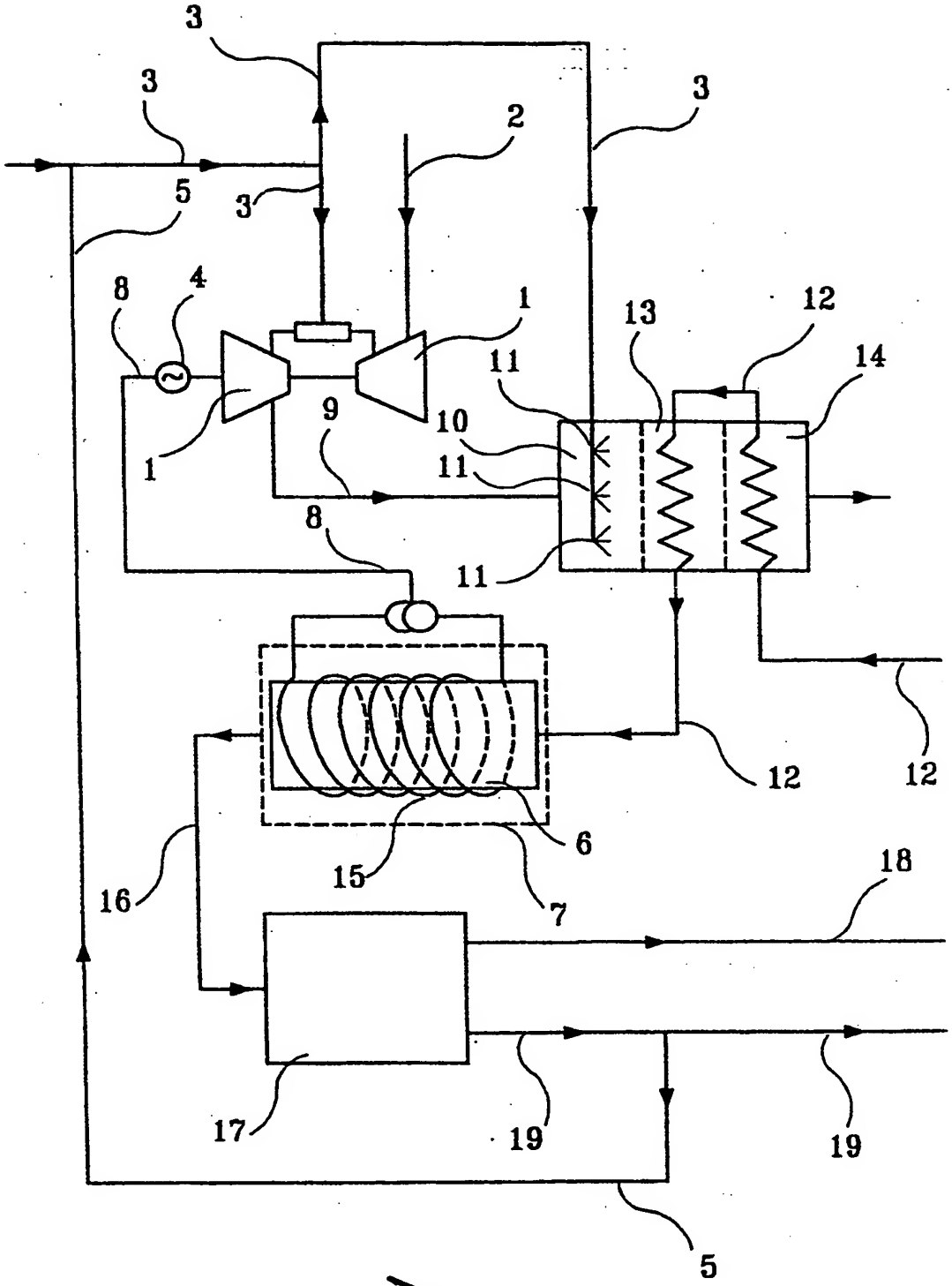

FIGURE 1